

# Nondual Quantum Duality

- To Show How The “Duality Versus Nonduality” Conflict Is Resolved Within Orthodox Quantum Theory
- To Show How The “Human Freedom Versus Determinism” Conflict Is Resolved Within Orthodox Quantum Theory.

# Classic Cartesian Duality

- Descartes' Two Realms:
- Res Cogitans: Thoughts, Ideas, and Feelings.  
[i.e., Mental/Psychological Realities]
- Res Extensa: Aspects of nature that we can describe by attaching mathematical properties to space-time points.  
[e.g., Spacetime Trajectories and Electric Fields  $E_i(x,t)$ .] {Quantum  $\Psi(x,t)$ }

# Newtonian Physics

- Builds upon Descartes, Galileo, & Kepler
- The dynamical laws are expressed exclusively in terms of ***physical*** properties: [Mental Aspects Are Left Completely Out Of The Dynamics.]
- Minds are “Detached Observers”!
- Effectively a Physical ***Nonduality*** (Physicalism).

# William James (1842-1910)

- James believed that a person's mind (willful intent) can influence that person's focus of attention, and thence that person's physical actions.
- That belief *contradicted* the basic classical-physics ideas of his day.
- "...never forget that the natural-science assumptions with which we started are provisional and revisable things." (1892)

# Quantum Mechanics: **The Re-entry of Mind**

- Planck's Constant (1900=1892+8)→  
Quantum Mechanics (1926).
- Bohr: *“In our description of nature the purpose is not to disclose the real essence of phenomena but only to track down as far as possible relations between the multifold aspects of our experience”.*  
(*Atomic Theory and the Description of Nature: p. 18*)

# Quantum Mechanics: **The Re-entry of Mind**

- Bohr: *“The sole aim [of quantum mechanics] is the comprehension of observations... (Atomic Physics and Human Knowledge: p.90)*
- Bohr: *The task of science is both to extend the range of our experience and reduce it to order... (Atomic Physics and the Description of Nature: p.1)*

# Quantum Mechanics: **The Re-entry of Mind**

- Heisenberg: *“The conception of the objective reality of the elementary particles has evaporated not into the cloud of some new reality concept, but into the transparent clarity of a mathematics that represents no longer the behaviour of the particles but our knowledge of this behavior.”* (Daedalus, 1958: p. 95.)

# Von Neumann/Heisenberg Dualistic Ontologicalization of QM

- Dualistic Dynamics: A **Mind-Brain Interaction** Governed by Quantum Dynamical Laws.  
[~ Cartesian Dualism]
- **Two** Mind-Brain Dynamical Interactions:
- **Process 1: Man** '*puts to nature*' a specific question. [~Bohr's "Free choice" of an Experimenter's Probing Action]
- **Process 3: Nature** Returns An Answer.
- Process 2: Purely Physical Evolution: Schr. Eqn.

# Separation of Powers

- **Man Asks: Nature Answers!**
- ***Man's* Choice is “Free”**: It is Not Constrained By Any Currently Known Law!
- **Nature's Choice is “Not Free”**: It is Constrained By A Quantum Statistical Rule!
- **Man's Choice is *Local***: It Has Only *Local* Immediate Physical Effects; Immediate Physical Effects Only On His Own Brain!
- **Nature's Choice is *Nonlocal*!**

# How Can Ontologically Different Types Interact?

- Links between things totally different from each other, with no commonalities at all, are hard to conceive.
- How can “what is linked to what” be defined without elements of commonality?
- Is not an **underlying** monism/nonduality required?

# The ontological character of the *physical aspect* of QM differs from that of CM

- The physical aspect of **classical/Newtonian** physics is *matter (material substance)*.
- It *evolves continuously*.
- The physical aspect of QM is the *quantum state*.
- It undergoes “quantum jumps”.
- Heisenberg: “The discontinuous change in the probability function ...takes place with the act of registration of the result in the mind of the observer” (Physics and Philosophy, p. 55)

# The ontological character of the quantum state

- According to the ontological ideas of Heisenberg, the quantum state is both a compendium of what has already happened, and “potentia” (**objective tendencies**) pertaining to future possible happenings/events.

# Potentia are Mindlike

- “Potentia” pertain to events that have not yet happened!
- They pertain to projections into the future.
- They involve elements like *imaginations of what might come to pass*.
- They resemble *envisaged possibilities*.
- They are, in these ways, **more like *mental* things than *material* things!**

# Quantum states, probabilities, and mind.

- The quantum state specifies probabilities.
- *Probabilities* are not matter-like.
- *Probabilities* involve mathematical connections that exist *outside* the actual realities to which they pertain.
- *Probabilities* involve *mindlike* computations and evaluations: weights assigned by a mental or mindlike process.

# Nondual Quantum Duality

- Von Neumann (Orthodox) Quantum Mechanics is Pragmatically and Technically Dualistic in the sense that it involves aspects of nature described in *physical* terms and aspects of nature described in *psychological* term, and dynamical laws of their *interaction*.
- **But these two aspects seem to rest upon a**  
*common mindlike underpinning!*

# Natural Process and Sufficient Reason

I subscribe to the idea that natural process creates an **unfolding of reality**: facts and truths come into being in an orderly way in accord with the precepts of relativistic quantum field theory.

I also subscribe to the *principle of sufficient reason*: no fact or truth can simply “*pop out of the blue*”, with no reason at all for being what it is.

Reconciliation of Human Freedom  
with the  
Principle of Sufficient Reason:

**Certainty versus Necessity**

# Certainty About The Future.

- Laplace: “For a sufficiently powerful computing intellect that at a certain moment knew all the laws and all the positions, nothing would be uncertain, and the future, just like the past, would be present before its eyes” (Condensed)
- This view argues for “certainty about the future” based on information existing at a certain moment. It posits:
- A computing intellect existing outside/beyond nature itself, able to “go” in thought where quantum (mind-based) nature has not yet gone.
- Invariant causal laws.

# The uncertainty of a necessary future!

- Nothing exists outside the whole of nature itself!
- Thus nature itself must make its own laws/habits.
- Even if there are sufficient reasons for every change in the laws, it is not evident that any intellect standing outside the evolving reality itself could compute what has not yet occurred.
- The evolution of reason-based reasons may be intrinsically less computable than the evolution of physically described properties evolving via fixed physically describable mathematical laws.

In a mind-based quantum universe,  
human freedom is not necessarily  
incompatible with the principle of  
sufficient reason!

- The supposition that the evolution of *reason-based reasons* is computable is an extrapolation from classical physics far too dubious to provide the basis of a **PROOF** that, in a mind-based quantum universe evolving in concordance with the principle of sufficient reason, the outcomes of human choices are *certain* prior to their actual occurrence.